# Operational Modeling

# Course Instructor

**Creative. Methodical. Meticulous.**

Duncan is fascinated with pedagogy and loves course creation and design. He is an effective communicator with extensive experience teaching financial modeling, accounting, analysis & valuation. Prior to teaching, Duncan held senior equity research positions with top banks & brokerages. He has solid analytical skills with an Engineering degree, Master of Finance degree and a CFA Charter.

**Duncan McKeen**

Executive Vice President

# Course Introduction

Operational Modeling

# Learning Objectives

**Explore** a framework and guidelines for effective financial modeling.

**Analyze** a company's operations and divide a financial model into schedules.

**Approach** each schedule with a consistent layout and structure.

**Calculate** key outputs within the model schedules.

**Finalize** and review the financial model, ensuring integrity.

**Create** and maintain a library of schedules or building blocks.

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# Course Outline

**Financial Modeling Overview**

**Revenue Schedule**

**Cost Schedule**

**Income Statement**

**Working Capital Schedule**

**Depreciation Schedule**

**Asset Schedule**

**Income Tax Schedule**

**Model Review**

**Library of Schedules**

# Financial Modeling Overview

Welcome to our course on **Operational Modeling**.

We will focus on common **operational** components of financial models.

This essentially means all parts of a model but not the **capital structure**.

Focusing on the **operations** helps us see what is actually driving the business.

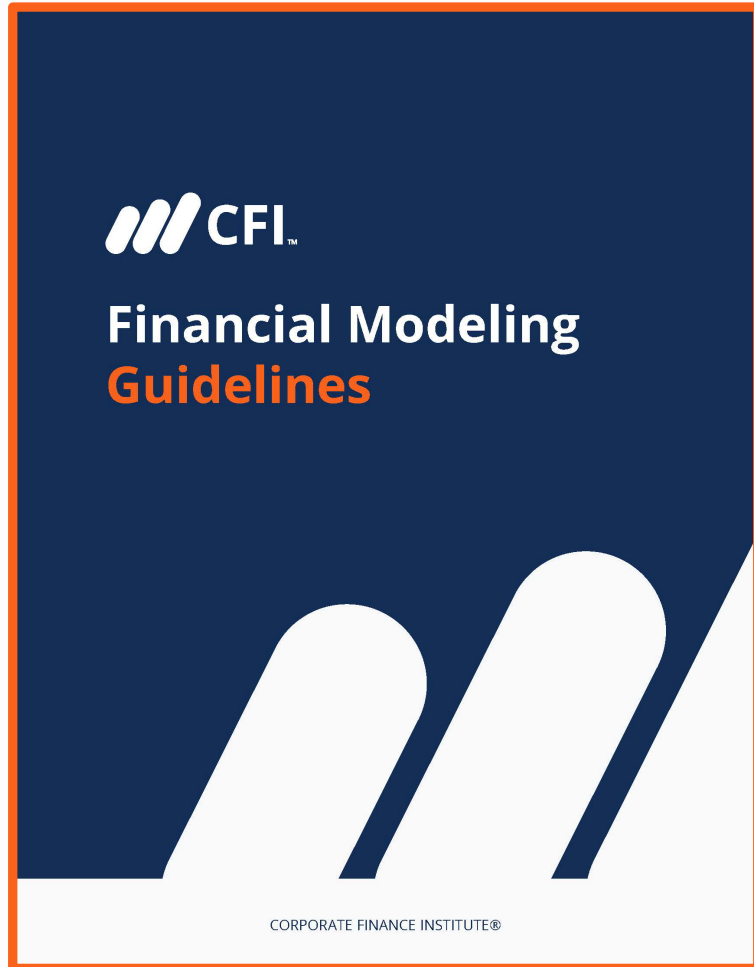# Financial Modeling Schedules

Revenue Schedule

Cost Schedule

Income Statement

Working Capital Schedule

Depreciation Schedule

Asset Schedule

Income Tax Schedule

**Library of Schedules**

**Building Blocks**

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# Financial Modeling Guidelines



- ✓ Revenue Schedule
- ✓ Cost Schedule
- ✓ Income Statement
- ✓ Working Capital Schedule
- ✓ Depreciation Schedule
- ✓ Asset Schedule
- ✓ Income Tax Schedule

# Financial Modeling Schedules

## 1. Enter

We always need to bring some figures into a **schedule.**

These often enter the schedule from the **top** or from the **left** side.

## 2. Calculate

This is where the real work is performed **inside the schedule.**

We use **formulas** to calculate the figures needed below to exit.

## 3. Exit

Calculated figures are **summarized** near the bottom of the schedule.

These will likely **flow** to other schedules within the financial model.

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# Financial Modeling Schedules

## 1. Enter

## 2. Calculate

## 3. Exit

### Working Capital Schedule

| *All figures in USD thousands unless stated* | | **2019A** | **2020A** | **2021A** | **2022F** | **2023F** | **2024F** | **2025F** | **2026F** |
|---|---|---|---|---|---|---|---|---|---|
| Days in Period | | 365 | 365 | 365 | 365 | 365 | 365 | 365 | 365 |
| Revenue | | 51,585 | 53,494 | 55,749 | 58,570 | 59,748 | 60,949 | 61,866 | 62,486 |
| COGS | | 27,697 | 28,429 | 29,200 | 30,356 | 31,337 | 32,350 | 33,197 | 34,066 |
| | | | | | | | | | |
| **AMOUNTS PER DAY** | | | | | | | | | |
| Accounts Receivable | *(Days)* | 40 | 43 | 43 | 45 | 45 | 45 | 45 | 45 |
| Inventory | *(Days)* | 24 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Accounts Payable | *(Days)* | 40 | 41 | 41 | 40 | 40 | 40 | 40 | 40 |
| | | | | | | | | | |
| **TOTAL AMOUNTS** | | | | | | | | | |
| Accounts Receivable | | 5,708 | 6,333 | 6,624 | 7,221 | 7,366 | 7,514 | 7,627 | 7,704 |
| Inventory | | 1,792 | 1,923 | 2,009 | 2,079 | 2,146 | 2,216 | 2,274 | 2,333 |
| Accounts Payable | | 3,024 | 3,205 | 3,319 | 3,327 | 3,434 | 3,545 | 3,638 | 3,733 |
| | | | | | | | | | |
| **NET WORKING CAPITAL** | | | | | | | | | |
| Current Assets | | 7,500 | 8,256 | 8,633 | 9,300 | 9,513 | 9,730 | 9,901 | 10,037 |
| Current Liabilities | | 3,024 | 3,205 | 3,319 | 3,327 | 3,434 | 3,545 | 3,638 | 3,733 |
| Net Working Capital | | 4,476 | 5,051 | 5,314 | 5,974 | 6,078 | 6,185 | 6,263 | 6,304 |
| | | | | | | | | | |
| **Cash from Working Capital Items** | | | (575) | (263) | (660) | (105) | (106) | (78) | (41) |

# Financial Modeling Review

We will demonstrate a **model review process** to check all our calculations.

✓ Revenue Schedule

✓ Cost Schedule

✓ Income Statement

✓ Working Capital Schedule

✓ Depreciation Schedule

✓ Asset Schedule

✓ Income Tax Schedule

**Financial Modeling Guidelines**
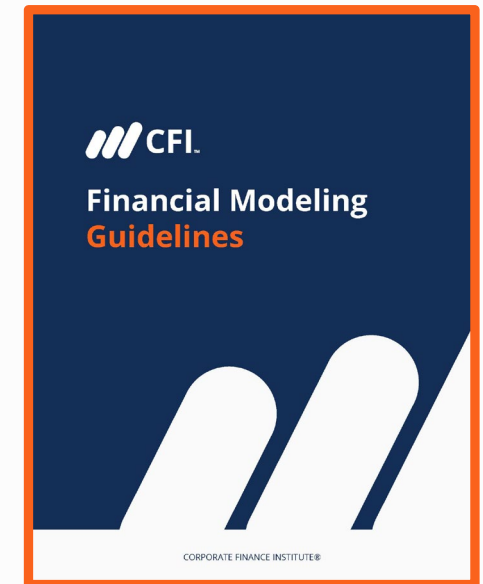
# Financial Modeling Library

| Revenue Schedule | Cost Schedule | Income Statement | Working Capital Schedule |
|---|---|---|---|

| Depreciation Schedule | Asset Schedule | Income Tax Schedule | Library of Schedules |
|---|---|---|---|

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**Library of Schedules**

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# Revenue Schedule

Effective financial modeling often begins with a thoughtful forecast of revenue.

## Schedule

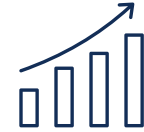The revenue schedule will house the relevant inputs and necessary calculations.

## Components

It is important to break revenue out into price and volume for material business lines.

**Price x Volume = Revenue**

## Learn and Analyze

This is a great opportunity to learn more about the underlying business and drivers for future growth.

## Growth Rates

Smaller business lines may be forecasted utilizing a revenue growth rate. This is appropriate when they have a small impact on the model.

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# Revenue Schedule

## 1. Enter

We require the **Days in Period** and the **Plant Capacity**.

We also need **Volume Growth** and **Pricing Increases**.

## 2. Calculate

We will **multiply price and volume** to calculate revenue.

It is important to break out price and volume for main business lines.

## 3. Exit

We need accurate revenue estimates for the business.

These will flow to the **income statement** later.

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# Revenue Schedule – Model Alerts

**Model alerts** are an effective way to flag potential issues with financial models.

We will build an alert which flags if sales volume exceeds plant capacity in any of the periods.

This prompts us that additional capital expenditure may be required to increase capacity.

## Revenue Schedule: Model Alerts

| All figures in USD thousands unless stated | | 2019A | 2020A | 2021A | 2022F | 2023F | 2024F | 2025F | 2026F |
|---|---|---|---|---|---|---|---|---|---|
| **OPERATIONS** | | | | | | | | | |
| Sales Volume Growth | | | 2.0% | 2.1% | 2.0% | 1.0% | 1.0% | 0.5% | 0.5% |
| Sales Volume | (Units/Day) | 1,374 | 1,401 | 1,430 | 1,459 | 1,473 | 1,488 | 1,495 | 1,503 |
| Plant Capacity | (Units/Day) | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 |
| Operational Efficiency | | 91.6% | 93.4% | 95.3% | 97.2% | 98.2% | 99.2% | 99.7% | 100.2% |
| Capacity Exceeded? | | - | - | - | - | - | - | - | **Yes** |

# Revenue Schedule – Smaller Business Lines

We can forecast a smaller business using a **revenue growth rate**.

This is a simplified approach that might be suitable for business divisions which are immaterial.

It does not offer insight into the financial impact of price and volume though.

## Revenue Schedule

| All figures in USD thousands unless stated | | 2019A | 2020A | 2021A | 2022F | 2023F | 2024F | 2025F | 2026F |
|---|---|---|---|---|---|---|---|---|---|
| **REVENUE: Core Business** | | | | | | | | | |
| Sales Volume | (Units) | 501,510 | 511,365 | 521,950 | 532,389 | 537,713 | 543,090 | 545,805 | 548,534 |
| Sales Price | (USD/Unit) | 102.86 | 104.61 | 106.81 | 110.01 | 111.11 | 112.23 | 113.35 | 113.91 |
| Revenue | | 51,585 | 53,494 | 55,749 | 58,570 | 59,748 | 60,949 | 61,866 | 62,486 |
| **REVENUE: Other** | | | | | | | | | |
| Revenue | | 2,115 | 2,532 | 3,152 | 3,782 | 4,539 | 5,447 | 6,536 | 7,843 |
| *YOY Growth (%)* | | - | 19.7% | 24.5% | 20.0% | 20.0% | 20.0% | 20.0% | 20.0% |

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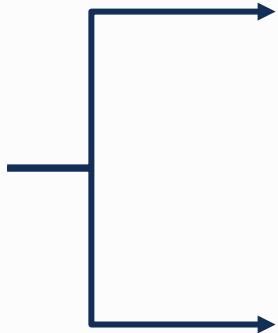
**Library of Schedules**

# Fixed & Variable Costs

Most businesses have fixed and variable components in their cost structure.

It is very important to break out the **fixed** and **variable** components separately when modeling.

**Cost of Sales**

**Variable Costs**

**Chemicals, Packaging, Transportation**

**Based** on unit volume.

As output increases, total variable costs increase.

**Fixed Costs**

**Labor, Insurance, Utilities**

**Not based** on unit volume.

As output increases, fixed costs remain constant.

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# Operational Leverage

The mix of fixed and variable costs in a business determines its **operational leverage.**

A business with a **higher proportion of fixed costs** has more operational leverage.

**Leverage makes good things better and bad things worse.**

## 5x

Higher leverage means more **amplification** of what is happening in the business.
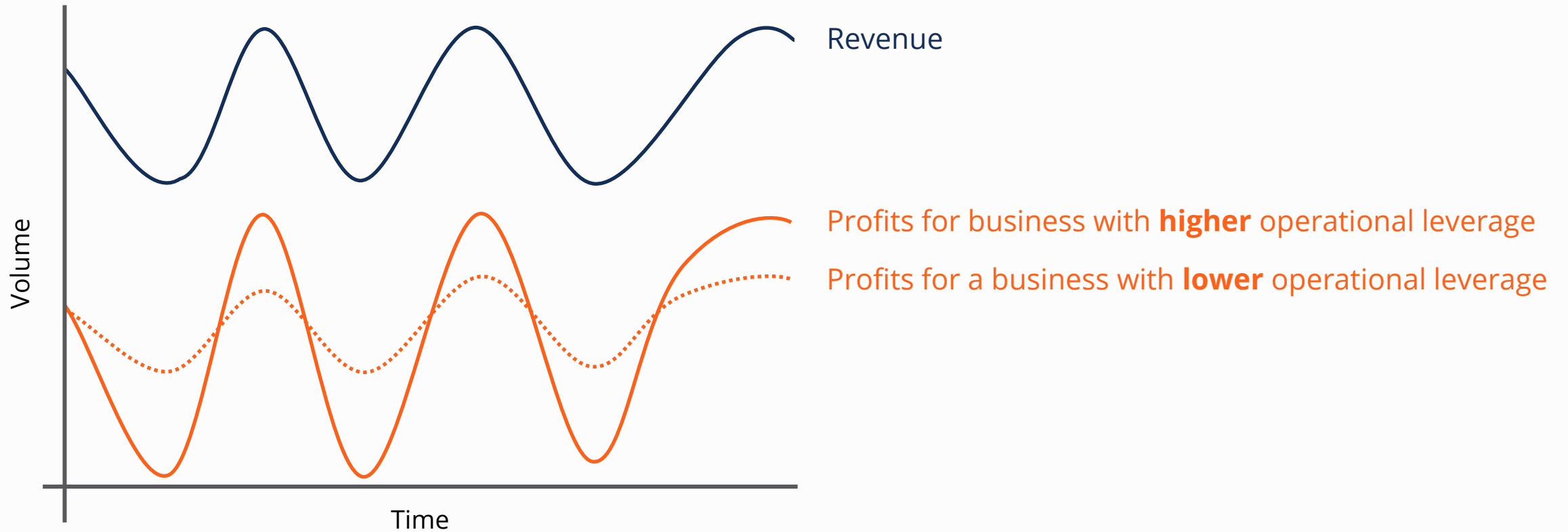
## 500%

Higher leverage thus means more **risk** but also the potential for more **return.**
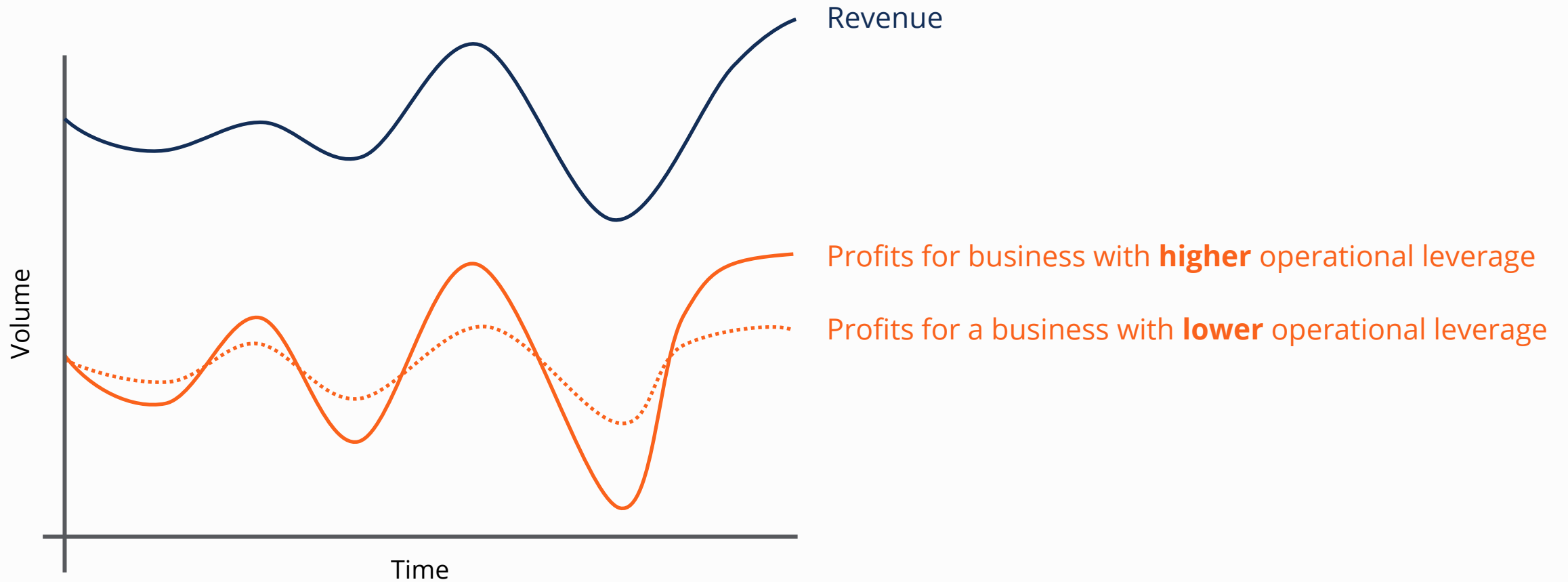
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# Operational Leverage

Profit is amplified as output grows since a portion of costs are fixed.

# Operational Leverage



Revenue

Profits for business with **higher** operational leverage

Profits for a business with **lower** operational leverage

Volume

Time
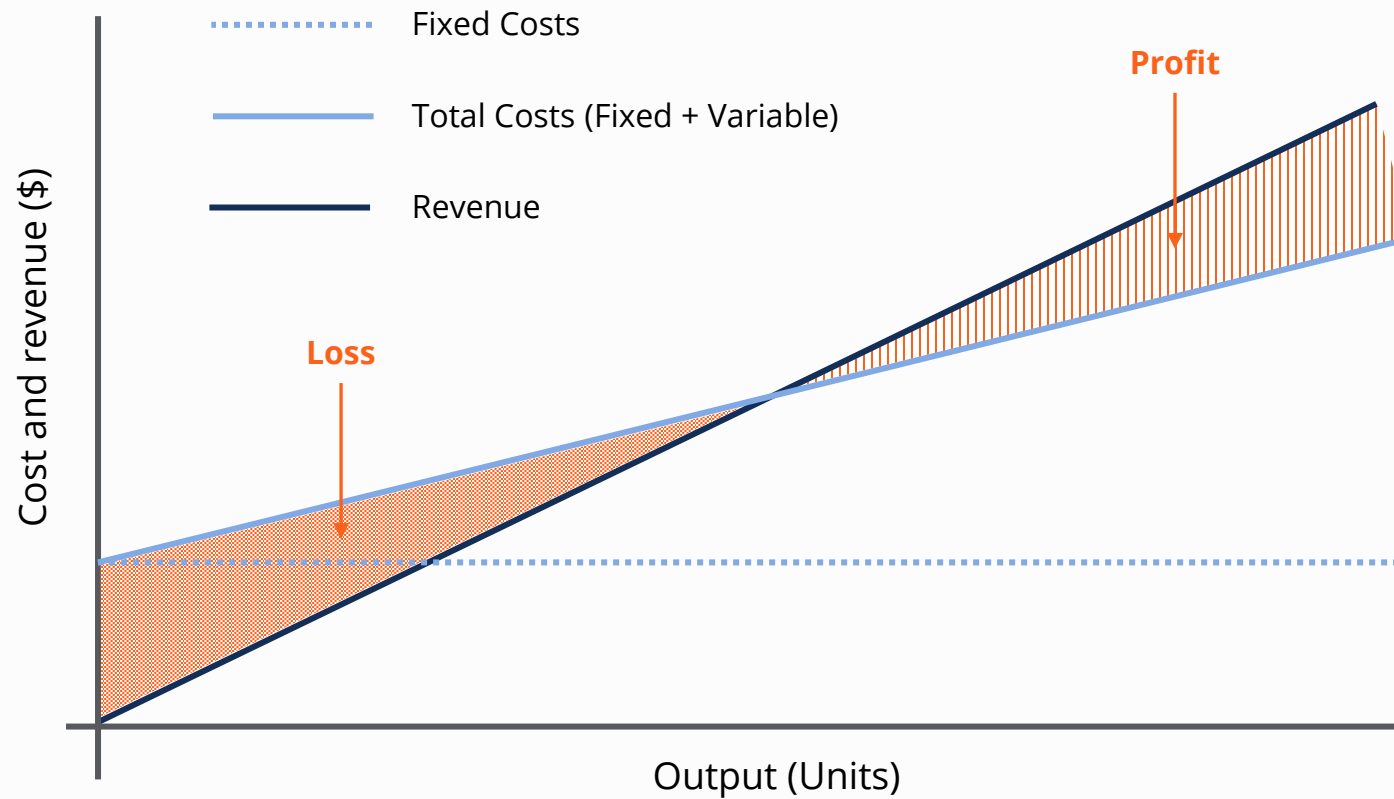
# Operational Leverage

# Cost Schedule

**1. Enter**

We will need an estimate of **sales volume** and **cost inflation**.

Sales volume will often be linked down from a revenue schedule.

**2. Calculate**

Forecast **variable** costs on per unit basis then convert to total amounts.

Forecast **fixed** costs in total amounts then convert to per unit basis.

**3. Exit**

We need the cost of goods sold (COGS).

This will flow to our **income statement** later.

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# Cost Schedule

There are **two steps** to forecast costs:

**01.** **Variable Costs**

Start with per unit amounts.
Then calculate total amounts.

**Cost / Unit x Units = Total Variable Costs**

**02.** **Fixed Costs**

Start with total amounts.
Then calculate per unit amounts.

**Total Fixed Cost / Sales Volume = Per Unit Fixed Cost**

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# Course Outline



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# Income Statement

An income statement is a summary which should be **linked** to supporting schedules.

Calculations should be done on the schedules then pulled into the income statement.

Provides a meaningful measure of the company's **profitability** for each period.

## Income Statement

| All figures in USD thousands unless stated | 2019A | 2020A | 2021A | 2022F | 2023F | 2024F | 2025F | 2026F |
|---|---|---|---|---|---|---|---|---|
| Inflation | 2.4% | 2.2% | 2.3% | 3.5% | 3.0% | 3.0% | 2.5% | 2.5% |
| | | | | | | | | |
| Revenue | 51,585 | 53,494 | 55,749 | 58,570 | 59,748 | 60,949 | 61,866 | 62,486 |
| COGS | 27,697 | 28,429 | 29,200 | 30,356 | 31,337 | 32,350 | 33,197 | 34,066 |
| **Gross Profit** | **23,888** | **25,065** | **26,550** | **28,215** | **28,411** | **28,599** | **28,669** | **28,420** |
| | | | | | | | | |
| SG&A | 5,877 | 6,006 | 6,144 | 6,359 | 6,550 | 6,746 | 6,915 | 7,088 |
| Other | 1,764 | 1,931 | 2,026 | 2,097 | 2,160 | 2,225 | 2,280 | 2,337 |
| **EBITDA** | **16,247** | **17,128** | **18,380** | **19,759** | **19,701** | **19,628** | **19,474** | **18,995** |
| | | | | | | | | |
| Depreciation | 2,960 | 3,196 | 3,452 | 4,177 | 4,408 | 4,647 | 4,893 | 5,147 |
| **EBIT** | **13,287** | **13,932** | **14,928** | **15,582** | **15,293** | **14,980** | **14,581** | **13,849** |
| | | | | | | | | |
| Interest | 1,488 | 2,580 | 2,448 | 2,520 | 2,520 | 2,520 | 2,520 | 2,520 |
| **EBT** | **11,799** | **11,352** | **12,480** | **13,062** | **12,773** | **12,460** | **12,061** | **11,329** |
| | | | | | | | | |
| Current Tax | – | – | – | – | – | 2,348 | 2,821 | 2,724 |
| Deferred Tax | 3,155 | 2,861 | 3,012 | 3,265 | 3,193 | 767 | 194 | 108 |
| Total Tax | 3,155 | 2,861 | 3,012 | 3,265 | 3,193 | 3,115 | 3,015 | 2,832 |
| | | | | | | | | |
| **Net Income** | **8,644** | **8,491** | **9,468** | **9,796** | **9,580** | **9,345** | **9,045** | **8,497** |

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# Accrual and Matching Principles

Both revenue and COGS need to be **driven by sales volume**.

## Income Statement

| All figures in USD thousands unless stated | 2019A | 2020A | 2021A |
|---|---|---|---|
| Inflation | 2.4% | 2.2% | 2.3% |
| Revenue | 51,585 | 53,494 | 55,749 |
| COGS | 27,697 | 28,429 | 29,200 |
| **Gross Profit** | **23,888** | **25,065** | **26,550** |

**Accrued** to correct period → Revenue

**Matched** to accrued revenue → COGS

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# Income Statement

## Income Statement

*All figures in USD thousands unless stated*

| | 2019A | 2020A | 2021A | 2022F | 2023F | 2024F | 2025F | 2026F |
|---|---|---|---|---|---|---|---|---|
| Inflation | 2.4% | 2.2% | 2.3% | 3.5% | 3.0% | 3.0% | 2.5% | 2.5% |
| | | | | | | | | |
| Revenue | 51,585 | 53,494 | 55,749 | 58,570 | 59,748 | 60,949 | 61,866 | 62,486 |
| COGS | 27,697 | 28,429 | 29,200 | 30,356 | 31,337 | 32,350 | 33,197 | 34,066 |
| **Gross Profit** | **23,888** | **25,065** | **26,550** | **28,215** | **28,411** | **28,599** | **28,669** | **28,420** |
| | | | | | | | | |
| SG&A | 5,877 | 6,006 | 6,144 | 6,359 | 6,550 | 6,746 | 6,915 | 7,088 |
| Other | 1,764 | 1,931 | 2,026 | 2,097 | 2,160 | 2,225 | 2,280 | 2,337 |
| **EBITDA** | **16,247** | **17,128** | **18,380** | **19,759** | **19,701** | **19,628** | **19,474** | **18,995** |
| | | | | | | | | |
| Depreciation | 2,960 | 3,196 | 3,452 | 4,177 | 4,408 | 4,647 | 4,893 | 5,147 |
| **EBIT** | **13,287** | **13,932** | **14,928** | **15,582** | **15,293** | **14,980** | **14,581** | **13,849** |
| Interest | 1,488 | 2,580 | 2,448 | 2,520 | 2,520 | 2,520 | 2,520 | 2,520 |
| **EBT** | **11,799** | **11,352** | **12,480** | **13,062** | **12,773** | **12,460** | **12,061** | **11,329** |
| | | | | | | | | |
| Current Tax | – | – | – | – | – | 2,348 | 2,821 | 2,724 |
| Deferred Tax | 3,155 | 2,861 | 3,012 | 3,265 | 3,193 | 767 | 194 | 108 |
| Total Tax | 3,155 | 2,861 | 3,012 | 3,265 | 3,193 | 3,115 | 3,015 | 2,832 |
| | | | | | | | | |
| **Net Income** | **8,644** | **8,491** | **9,468** | **9,796** | **9,580** | **9,345** | **9,045** | **8,497** |

**IFRS Defined** → Gross Profit

**Non-IFRS Defined** → EBITDA, EBIT, EBT

**IFRS Defined** → Net Income

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**Model Review**

**Library of Schedules**

# Working Capital Schedule

One company's A/P is another's A/R. This creates a natural tension between companies.

Working capital needs to be carefully considered, given its **impact on cash flow.**

Movements in working capital items can either **consume** or **produce** cash.

## Working Capital Schedule

| All figures in USD thousands unless stated | | 2019A | 2020A | 2021A | 2022F | 2023F | 2024F | 2025F | 2026F |
|---|---|---|---|---|---|---|---|---|---|
| Days in Period | | 365 | 365 | 365 | 365 | 365 | 365 | 365 | 365 |
| Revenue | | 51,585 | 53,494 | 55,749 | 58,570 | 59,748 | 60,949 | 61,866 | 62,486 |
| COGS | | 27,697 | 28,429 | 29,200 | 30,356 | 31,337 | 32,350 | 33,197 | 34,066 |
| **AMOUNTS PER DAY** | | | | | | | | | |
| Accounts Receivable | (Days) | 40 | 43 | 43 | 45 | 45 | 45 | 45 | 45 |
| Inventory | (Days) | 24 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Accounts Payable | (Days) | 40 | 41 | 41 | 40 | 40 | 40 | 40 | 40 |
| **TOTAL AMOUNTS** | | | | | | | | | |
| Accounts Receivable | | 5,708 | 6,333 | 6,624 | 7,221 | 7,366 | 7,514 | 7,627 | 7,704 |
| Inventory | | 1,792 | 1,923 | 2,009 | 2,079 | 2,146 | 2,216 | 2,274 | 2,333 |
| Accounts Payable | | 3,024 | 3,205 | 3,319 | 3,327 | 3,434 | 3,545 | 3,638 | 3,733 |
| **NET WORKING CAPITAL** | | | | | | | | | |
| Current Assets | | 7,500 | 8,256 | 8,633 | 9,300 | 9,513 | 9,730 | 9,901 | 10,037 |
| Current Liabilities | | 3,024 | 3,205 | 3,319 | 3,327 | 3,434 | 3,545 | 3,638 | 3,733 |
| Net Working Capital | | 4,476 | 5,051 | 5,314 | 5,974 | 6,078 | 6,185 | 6,263 | 6,304 |
| **Cash from Working Capital Items** | | | (575) | (263) | (660) | (105) | (106) | (78) | (41) |

# Working Capital Schedule

**1. Enter**

Key inputs include **Days in Period, Revenue** and **COGS.**

**2. Calculate**

We need to calculate **historical** metrics in **number of days**.

Convert forecasts from **number of days** to **total dollar amounts**.

**3. Exit**

Future account balances required for the balance sheet.

**Cash from working capital items** required for cash flow analysis.

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# Accounts Receivable Calculations

Number of days on average it takes the business to **collect** on its receivables.

Sales are the key driver of a company's accounts receivable balance.

Companies are always looking for ways to **speed up collection.**

$$\text{A/R Days} = \frac{\text{Accounts Receivable (\$)}}{\text{Revenue (\$)}} \times \text{Days in Period}$$

$$\text{A/R Total} = \frac{\text{A/R Days}}{\text{Days in Period}} \times \text{Revenue (\$)}$$

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# Inventory Calculations

Number of days on average for which inventory is held prior to sale.

Cost of sales are the key driver of the inventory balance.

Companies like to move their inventory and **reduce their average inventory days.**

$$\text{Inventory Days} = \frac{\text{Inventory (\$)}}{\text{COGS (\$)}} \times \text{Days in Period}$$

$$\text{Inventory Total} = \frac{\text{Inventory Days}}{\text{Days in Period}} \times \text{COGS (\$)}$$

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# Accounts Payable Calculations

Number of days on average it takes the business to **pay** its suppliers.

Purchases on credit are the key driver of the account's payable balance.

Companies like to stretch their payables and **pay suppliers slowly.**

$$\text{A/P Days} = \frac{\text{Accounts Payable (\$)}}{\text{COGS (\$)}} \times \text{Days in Period}$$

$$\text{A/P Total} = \frac{\text{A/P Days}}{\text{Days in Period}} \times \text{COGS (\$)}$$

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|---|---|---|---|---|

| Depreciation Schedule | Asset Schedule | Income Tax Schedule | Model Review | Library of Schedules |
|---|---|---|---|---|

# Depreciation Expense

The cost of a fixed asset is allocated  **over its useful life** as it generates economic benefits over that time.

The depreciation expense should be recorded in the **same period** as the economic benefit it generated.

This allocation should be done irrespective of when the cash was sent to the equipment supplier.

Depreciation expense is an example of the **matching principle**.
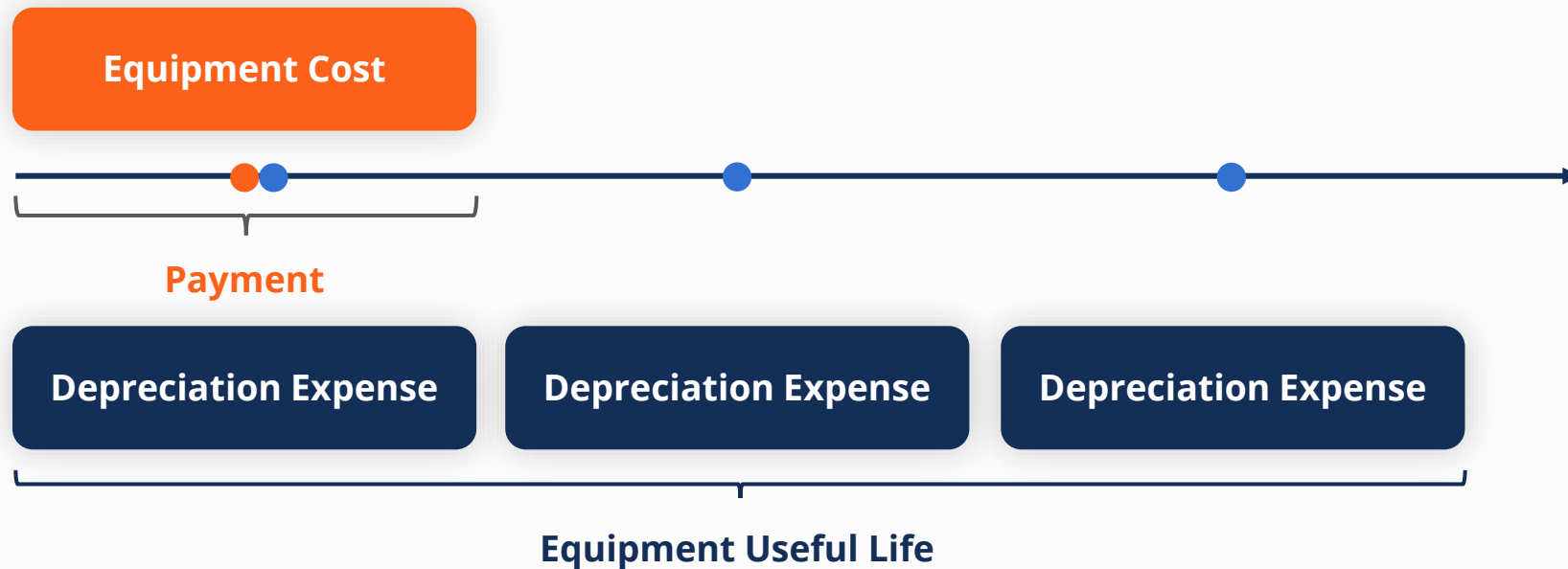
# Depreciation Modeling

Depreciation needs to be considered in the two parts illustrated below

### Existing Assets

- Assets the company already owns.

- We assume 100% depreciation in the first year since the assets are already owned.

### New Assets

- Assets the company is expected to buy in the future.

- We need to consider the timing of these asset purchases.

**Note:** Land has an infinite useful life and is not depreciated.

# Depreciation Modeling - New Assets

Need to consider when the company will purchase the assets within each period.

Timing of asset purchases will depend on the company's **capital budgeting preferences.**

The timing of these purchases will impact our depreciation calculations.

**100%**

If the assets are purchased at the **start** of the year, then we can allocate a **full year** of depreciation expense in the first year.

**50%**

If the assets are purchased in the **middle** of the year, then we only allocate a **half-year** of depreciation for the company in the first year.

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# Depreciation Schedule

### 1. Enter

Opening PP&E balance, capex forecast and first year allocation.

The **useful lives** for both existing and new assets will also be needed.

### 2. Calculate

Perform the depreciation calculations **within the schedule.**

Calculate depreciation for both **existing** and **new** assets.

### 3. Exit

We need the company's **total depreciation expense**.

This will flow to the company's income statement.

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# Accounting versus Tax Basis

Asset values must be tracked for both **accounting purposes** and for **tax purposes.**

These are similar in concept but there are **some differences** to consider.

**Tracking of Asset Values**

**Accounting Basis**

PP&E tracked and reported on the IFRS financials.

**Tax Basis**

Tracked by the government and used to determine taxable income.
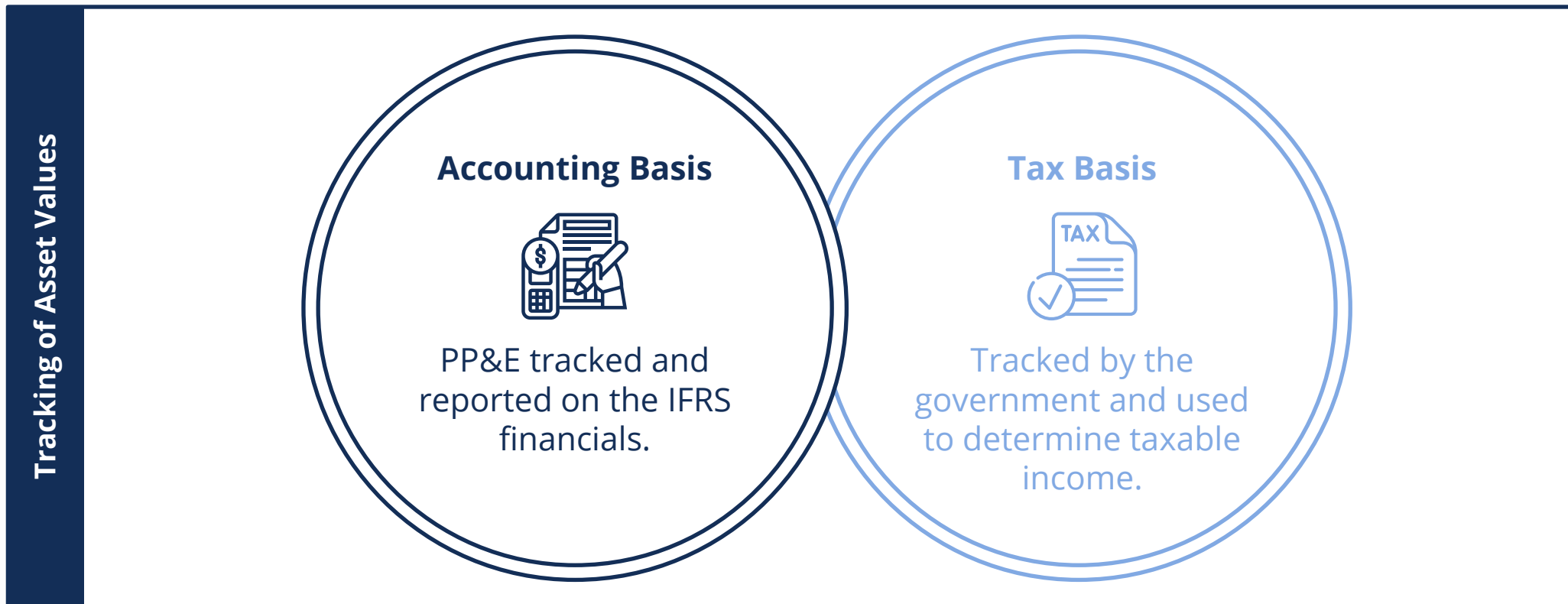
# Asset Schedule (Accounting Basis)

**1. Enter**

Opening **PP&E** balance, capex additions, **accounting** depreciation.

Some of these figures can be found on a depreciation schedule.

**2. Calculate**

We need to calculate the future balances for the **PP&E**.

These will be calculated inside a **corkscrew** formation.

**3. Exit**

The ending **PP&E** amounts for each period are needed.

These may flow to a balance sheet later.

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# Asset Schedule (Tax Basis)

## 1. Enter

Opening **Tax Basis**, capex additions, **tax** depreciation rate.

We also need the first-year tax depreciation assumption.

## 2. Calculate

We need to calculate the future balances for the **Tax Basis**.

These will be calculated inside a **corkscrew** formation.

## 3. Exit

The ending **Tax Basis** amounts for each period are needed.

These will allow us to calculate our future tax depreciation.

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# Asset Schedule - Corkscrews

Use a **corkscrew** to track an account which is changing over time.

## Asset Schedule

| All figures in USD thousands unless stated | 2020A | 2021A | 2022F | 2023F | 2024F | 2025F | 2026F |
|---|---|---|---|---|---|---|---|
| Capital Expenditure | 5,199 | 4,400 | 4,550 | 4,700 | 4,850 | 5,000 | 5,125 |
| Blended Tax Depreciation Rate | | | 15.0% | 15.0% | 15.0% | 15.0% | 15.0% |

| First Year Tax Depreciation | 50% |
|---|---|

**Property Plant & Equipment**

| | | | | | | |
|---|---|---|---|---|---|---|
| Beginning | | 65,014 | 65,387 | 65,679 | 65,881 | 65,988 |
| Capital Expenditure | | 4,550 | 4,700 | 4,850 | 5,000 | 5,125 |
| Accounting Depreciation | | (4,177) | (4,408) | (4,647) | (4,893) | (5,147) |
| Ending | 65,014 | 65,387 | 65,679 | 65,881 | 65,988 | 65,967 |

**Tax Basis**

| | | | | | | |
|---|---|---|---|---|---|---|
| Beginning | | 39,211 | 37,538 | 36,255 | 35,303 | 34,632 |
| Capital Expenditure | | 4,550 | 4,700 | 4,850 | 5,000 | 5,125 |
| Tax Depreciation | | (6,223) | (5,983) | (5,802) | (5,670) | (5,579) |
| Ending | 39,211 | 37,538 | 36,255 | 35,303 | 34,632 | 34,178 |

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# Course Outline

**Financial Modeling Overview**

**Revenue Schedule**

**Cost Schedule**

**Income Statement**

**Working Capital Schedule**

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**Asset Schedule**

**Income Tax Schedule**

**Model Review**

**Library of Schedules**

# Income Statement

Many companies only show one line for **total tax** on their income statement. It is important to break total tax into **current tax** and **deferred tax**.

## Income Statement

| All figures in USD thousands unless stated | 2019A | 2020A | 2021A | 2022F | 2023F | 2024F | 2025F | 2026F |
|---|---|---|---|---|---|---|---|---|
| Inflation | 2.4% | 2.2% | 2.3% | 3.5% | 3.0% | 3.0% | 2.5% | 2.5% |
| | | | | | | | | |
| Revenue | 51,585 | 53,494 | 55,749 | 58,570 | 59,748 | 60,949 | 61,866 | 62,486 |
| COGS | 27,697 | 28,429 | 29,200 | 30,356 | 31,337 | 32,350 | 33,197 | 34,066 |
| **Gross Profit** | **23,888** | **25,065** | **26,550** | **28,215** | **28,411** | **28,599** | **28,669** | **28,420** |
| | | | | | | | | |
| SG&A | 5,877 | 6,006 | 6,144 | 6,359 | 6,550 | 6,746 | 6,915 | 7,088 |
| Other | 1,764 | 1,931 | 2,026 | 2,097 | 2,160 | 2,225 | 2,280 | 2,337 |
| **EBITDA** | **16,247** | **17,128** | **18,380** | **19,759** | **19,701** | **19,628** | **19,474** | **18,995** |
| | | | | | | | | |
| Depreciation | 2,960 | 3,196 | 3,452 | 4,177 | 4,408 | 4,647 | 4,893 | 5,147 |
| **EBIT** | **13,287** | **13,932** | **14,928** | **15,582** | **15,293** | **14,980** | **14,581** | **13,849** |
| | | | | | | | | |
| Interest | 1,488 | 2,580 | 2,448 | 2,520 | 2,520 | 2,520 | 2,520 | 2,520 |
| **EBT** | **11,799** | **11,352** | **12,480** | **13,062** | **12,773** | **12,460** | **12,061** | **11,329** |
| Current Tax | – | – | – | – | – | 2,348 | 2,821 | 2,724 |
| Deferred Tax | 3,155 | 2,861 | 3,012 | 3,265 | 3,193 | 767 | 194 | 108 |
| Total Tax | 3,155 | 2,861 | 3,012 | 3,265 | 3,193 | 3,115 | 3,015 | 2,832 |
| | | | | | | | | |
| **Net Income** | **8,644** | **8,491** | **9,468** | **9,796** | **9,580** | **9,345** | **9,045** | **8,497** |

# Accounting Treatment of Income Taxes

Income tax expense includes both **current** and **deferred** components under both IFRS and US GAAP. We need to break out the **current taxes** since they are **cash outflows.**

## Current Tax Expense

The amount of tax due to the tax authorities in the **current** period.

**(Cash taxes)**

**+**

## Deferred Tax Expense

The amount of tax due to the tax authorities in **future** periods

**(Non-cash taxes)**

**=**

## Total Tax Expense

The total amount shown on the income statement for the period

**(Total taxes)**

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# Accounting Income Versus Taxable Income

We need to understand the differences between **accounting income** and **taxable income**.
It is these differences that lead to deferred taxes for companies.

## Accounting Income

- The profit or loss for a period before deducting tax expense.

- It is Earnings Before Tax (EBT) on the **income statement** for the period.

## Taxable Income

- The profit or loss for a period determined in accordance with rules established by taxation authorities.

- This will appear on **tax returns**.

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# Special Concessions Offered

Governments in many jurisdictions offer **special concessions** to companies.

These concessions help companies by deferring taxes to a **later date.**

There can be **large numbers** of special concessions offered.

Many concessions are **not material** and may not warrant inclusion in our models.

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# Accounting Income versus Taxable Income

There are **many** differences between **accounting** and **taxable** income.

We will focus on **two** considerable differences that occur in **many jurisdictions**.

**Accelerated Depreciation**

Many tax jurisdictions allow for some form of **accelerated depreciation.**

**Loss Carryforwards**

Many tax jurisdictions allow some **mechanism to carry forward losses.**

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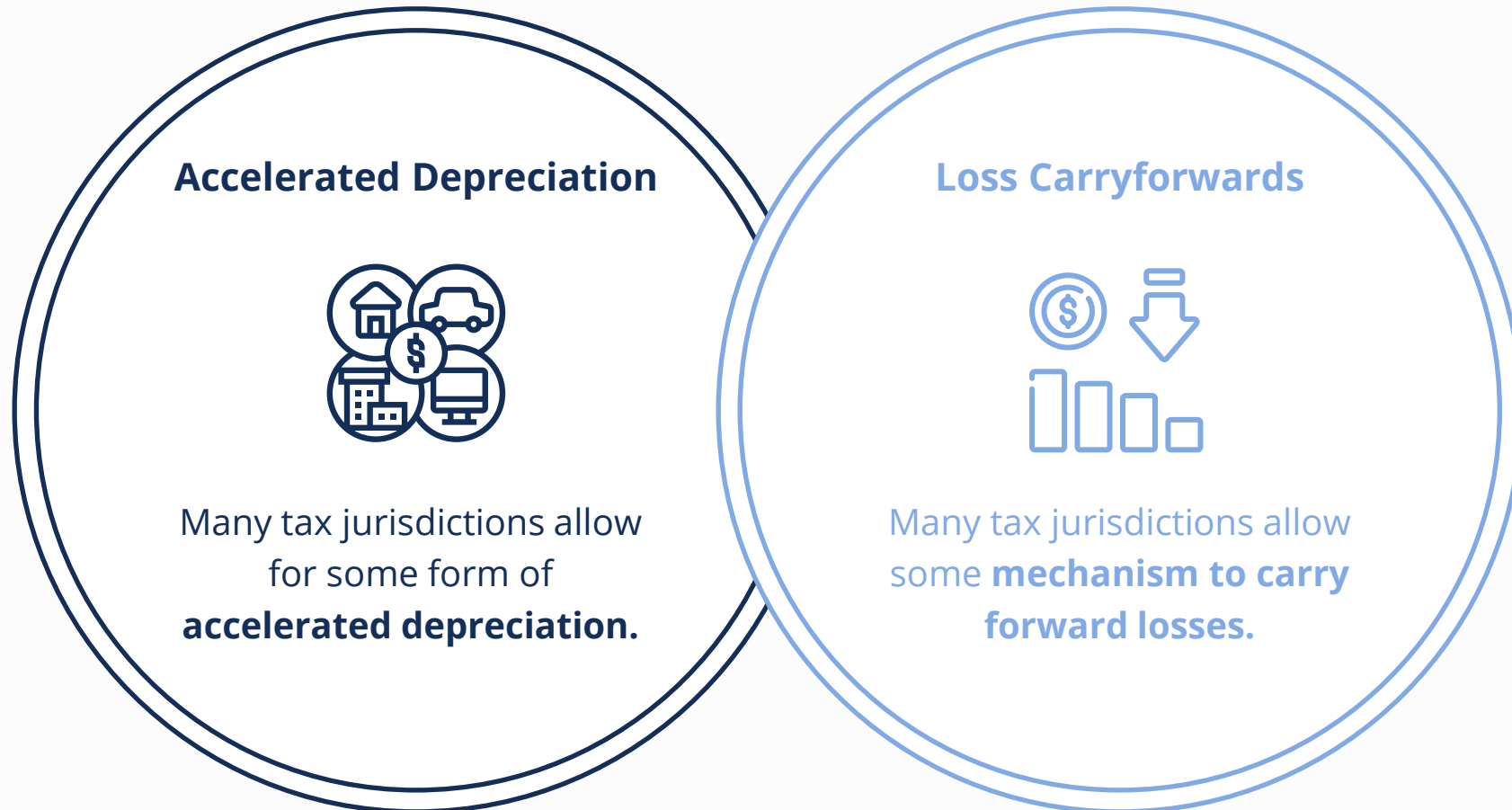
# 1) Accelerated Depreciation

Accounting rules determine the depreciation method based on the usage and the **useful life.**

Governments in many jurisdictions allow some form of **accelerated depreciation** for tax purposes.

This concession often leads higher depreciation expenses early in the asset life and **lowers taxable income.**

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# 2) Loss Carryforward

Accounting rules typically **do not allow** companies to carry a loss forward into the future as a credit.

Governments in many jurisdictions **allow** companies a mechanism to carry losses forward.

These losses can accumulate over time and **act like credits** to lower taxable income for the company in the future.

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# Tax Schedule – Calculation Overview

Our calculation of Taxable Income will be handled in **two components**.

| 1. Adjustment for Depreciation | |
|---|---|
| **Accounting Income** (EBT) | $------- |
| **+ Accounting Depreciation** | $------- |
| **- Tax Depreciation** | ($-------) |
| **= EBT After Adjustment** | $------- |

| 2. Adjustment for Tax Losses | |
|---|---|
| **EBT After Adjustment** | $------- |
| **- Use of Tax Losses** | ($-------) |
| **= Taxable Income** | $------- |

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# Accounting Treatment of Income Taxes

We can now determine **all our tax expense figures** required for financial analysis

| **Deferred Tax Expense** | | **Total Tax Expense** | | **Current Tax Expense** |
|---|---|---|---|---|
| Can calculate from other tax amounts | **=** | Will appear on the income statement. | **-** | Due to the government in the current period. |
| **Total Tax Expense – Current Tax Expense** | | **Tax Rate x Accounting Income** | | **Tax Rate x Taxable Income** |

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# Tax Schedule

### 1. Enter

**Key inputs include** Earnings Before Taxes (EBT), accounting depreciation, tax depreciation and tax loss pool.

### 2. Calculate

We will begin with **Accounting Income** (EBT) and modify it to be **Taxable Income**.

### 3. Exit

Tax expenses are needed for the **income statement** and **cash flow statement**.

Current taxes are needed to calculate **free cash flow** for a **DCF valuation**.

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# Model Review



Preparing a **clean** and **presentable** financial model is critical.

Model builders should always **review their work carefully**.

Peers should also review their work for **consistency** and **integrity**.

This is especially important with more **complex** models.

There are **powerful tools** that can assist with model reviews.

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# Model Review – Locating Inputs

Excel offers some tools to find **manual inputs** in a model.

Use **F5** to activate the **Go To** dialogue box and then select **Special**.

Select **Constants** and **uncheck Text** so labels are not highlighted.

This will highlight **all inputs** unless they are preceded by an equal sign.

While these inputs are highlighted the **Fill Color** can be changed.

Change the Fill Color using **ALT HH** and select from the palette.
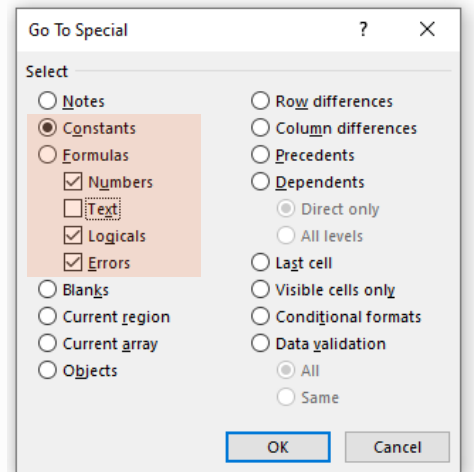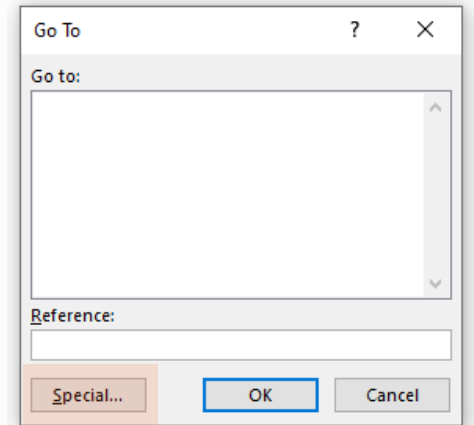
# Model Review – Check One Column in Detail

It is best to check a model **one section** at a time starting with the **left most column**.

Using **F2** to enter each cell and perform a manual check before confirming **row differences** from left to right.

## Revenue Schedule

| All figures in USD thousands unless stated | | 2019A | 2020A | 2021A | 2022F | 2023F | 2024F | 2025F | 2026F |
|---|---|---|---|---|---|---|---|---|---|
| Days in Period | | 365 | 365 | 365 | 365 | 365 | 365 | 365 | 365 |
| **OPERATIONS** | | | | | | | | | |
| Sales Volume Growth | | | 2.0% | 2.1% | 2.0% | 1.0% | 1.0% | 0.5% | 0.5% |
| Sales Volume | (Units/Day) | 1,374 | 1,401 | 1,430 | 1,459 | 1,473 | 1,488 | 1,495 | 1,503 |
| Plant Capacity | (Units/Day) | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 |
| Operational Efficiency | | 91.6% | 93.4% | 95.3% | 97.2% | 98.2% | 99.2% | 99.7% | 100.2% |
| **VOLUME** | | | | | | | | | |
| Days in Period | | 365 | 365 | 365 | 365 | 365 | 365 | 365 | 365 |
| Sales Volume | (Units/Day) | 1,374 | 1,401 | 1,430 | 1,459 | 1,473 | 1,488 | 1,495 | 1,503 |
| Sales Volume | (Units) | 501,510 | 511,365 | 521,950 | 532,389 | 537,713 | 543,090 | 545,805 | 548,534 |
| **PRICING** | | | | | | | | | |
| Pricing Increases | | | 1.7% | 2.1% | 3.0% | 1.0% | 1.0% | 1.0% | 0.5% |
| Unit Price | (USD/Unit) | 102.86 | 104.61 | 106.81 | 110.01 | 111.11 | 112.23 | 113.35 | 113.91 |
| Capacity Exceeded? | | - | - | - | - | - | - | - | **Yes** |

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# Model Review – Checking for Differences

Check **row differences** from the left hand column across to the right.

Hit **F5** for **Go To** then **Special** and select **Row differences**.

Apply this check across **entire sections** of the model at a time.

**Keyboard Shortcuts**

- Use **CTRL \** to go straight into **row differences**.

- Use **CTRL SHIFT \** to go straight into **column differences**.
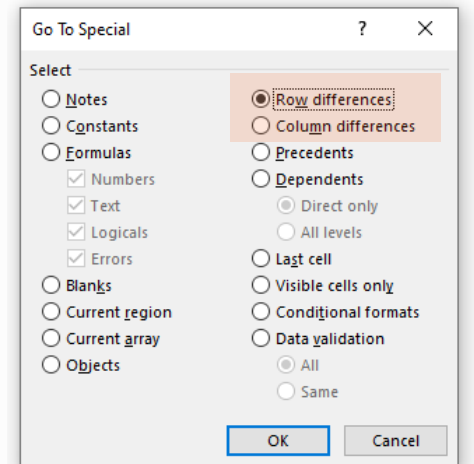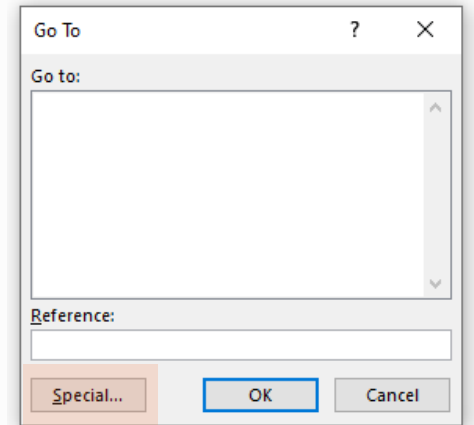
# Model Review – Macabacus Tools



## Pro Precedents
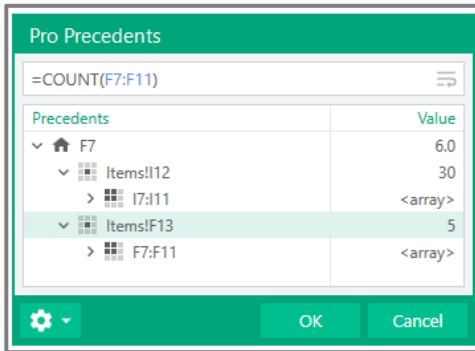
## File Optimization
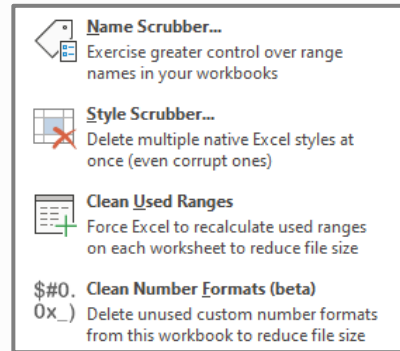
## AutoColor
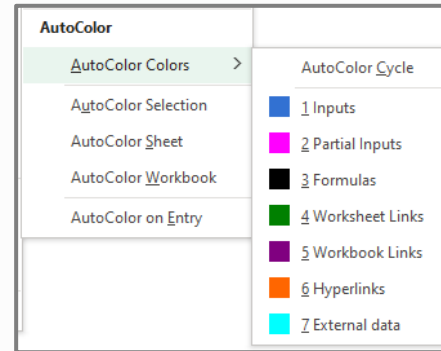
## Prepare to Share
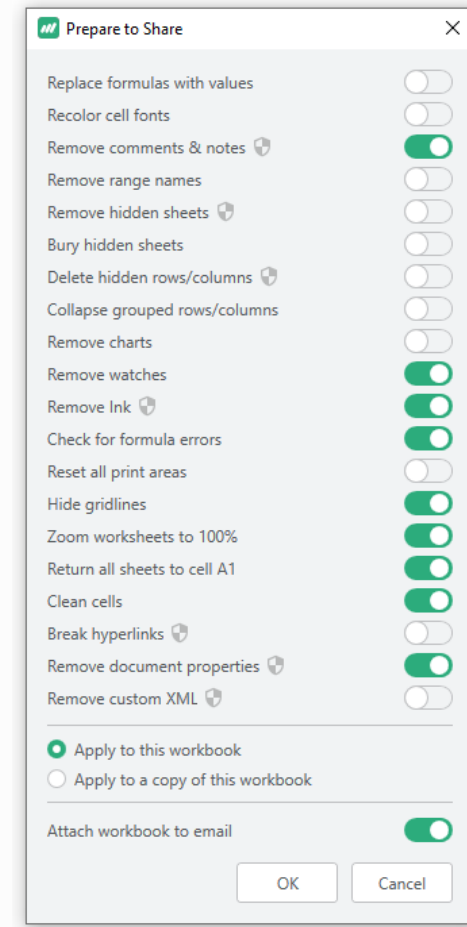
## Show All Precedents

## Visualization Tools
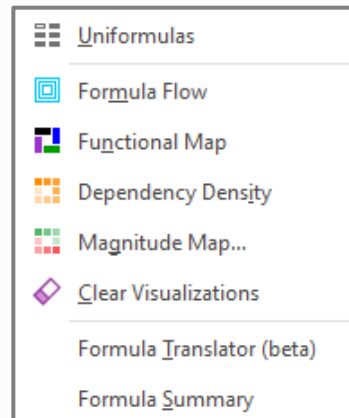
## Super Find

# Model Review – Macabacus Tools

## Explorer Pane

Explorer

⚙▾ 🖼 📄 ↻ ⌄⌃ ⌗ ✕

⌄ X Operational Modeling.xlsx
  › 📄 Cover
  › 📄 Dashboard
  › 📄 Drivers
  › 📄 Model

## Page Setup

**Page Setup**

⊠ Hide Page Breaks

⊡ Smart Print Area

　 Set Print Areas

　 Remove Print Areas

## Document Inspector

Document Inspector　　　　　? ✕

To check the document for the selected content, click Inspect.

☑ **Comments**
　Inspects the document for comments.

☑ **Document Properties and Personal Information**
　Inspects for hidden metadata or personal information saved with the document.

☑ **Data Model**
　Inspects Data Model for embedded data that may not be visible on the sheets.

☑ **Content Add-ins**
　Inspects for Content add-ins saved in the document body.

☑ **Task Pane Add-ins**
　Inspects for Task Pane add-ins saved in the document.

☑ **PivotTables, PivotCharts, Cube Formulas, Slicers, and Timelines**
　Inspects for PivotTables, PivotCharts, cube formulas, slicers, and timelines, which may include data that's not visible on the sheets.

☑ **Embedded Documents**
　Inspects for embedded documents, which may include information that's not visible in the file.

　　　　　　　　[ Inspect ]　[ Close ]

## Buried Sheets

**Sheets**

　Navigate　　　　　›
　Move　　　　　　›
　Buried Sheets　　　›　　Bury Selected Sheets
　Unhide Sheets...　　　　Bury Hidden Sheets
　　　　　　　　　　　　Dig Up Buried Sheets

## Footnotes
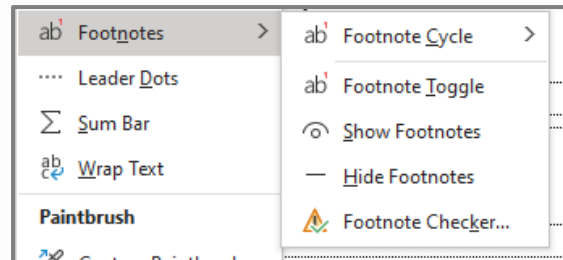
ab¹ Footnotes　　　›　　ab¹ Footnote Cycle　›
···· Leader Dots　　　　ab¹ Footnote Toggle
Σ Sum Bar　　　　　　⊙ Show Footnotes
ab Wrap Text　　　　　— Hide Footnotes
**Paintbrush**　　　　　⚠ Footnote Checker...

# Course Outline

**Financial Modeling Overview**

**Revenue Schedule**

**Cost Schedule**

**Income Statement**

**Working Capital Schedule**

**Depreciation Schedule**

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**Model Review**

**Library of Schedules**

# Library of Schedules

We've looked past the company's capital structure and focused through on its **operations**.

When we analyze the core operations, we can understand the **strengths** and **weaknesses** of the business.

It is critical to know how to build these schedules **the right way.**

Now that they've been built and reviewed, we can store them away for **future use.**

Those engaged in financial modeling typically have **portfolios** of schedules, which facilitate model construction.

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# Library of Schedules

**Building Blocks**
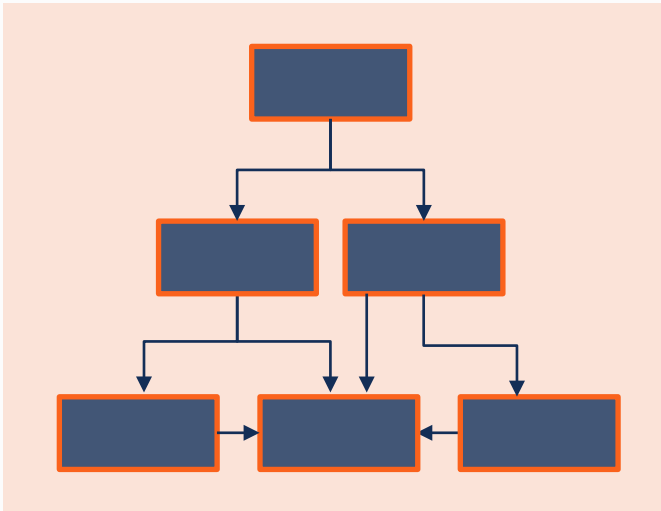
**Financial Model**

# Library of Schedules



| Revenue Schedule | | 2019A | 2020A | 2021A | 2022F | 2023F | 2024F | 2025F | 2026F |
|---|---|---|---|---|---|---|---|---|---|
| All figures in USD thousands unless stated | | | | | | | | | |
| Days in Period | | 365 | 365 | 365 | 365 | 365 | 365 | 365 | 365 |
| **OPERATIONS** | | | | | | | | | |
| Sales Volume Growth | | | 2.0% | 2.1% | 2.0% | 1.0% | 1.0% | 0.5% | 0.5% |
| Sales Volume | (Units/Day) | 1,374 | 1,401 | 1,430 | 1,459 | 1,473 | 1,488 | 1,495 | 1,503 |
| Plant Capacity | (Units/Day) | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 |
| Operational Efficiency | | 91.6% | 93.4% | 95.3% | 97.2% | 98.2% | 99.2% | 99.7% | 100.2% |
| **VOLUME** | | | | | | | | | |
| Days in Period | | 365 | 365 | 365 | 365 | 365 | 365 | 365 | 365 |
| Sales Volume | (Units/Day) | 1,374 | 1,401 | 1,430 | 1,459 | 1,473 | 1,488 | 1,495 | 1,503 |
| Sales Volume | (Units) | 501,510 | 511,365 | 521,950 | 532,389 | 537,713 | 543,090 | 545,805 | 548,534 |
| **PRICING** | | | | | | | | | |
| Pricing Increases | | | 1.7% | 2.1% | 3.0% | 1.0% | 1.0% | 1.0% | 0.5% |
| Unit Price | (USD/Unit) | 102.86 | 104.61 | 106.81 | 110.01 | 111.11 | 112.23 | 113.35 | 113.91 |
| **REVENUE** | | | | | | | | | |
| Sales Volume | (Units) | 501,510 | 511,365 | 521,950 | 532,389 | 537,713 | 543,090 | 545,805 | 548,534 |
| Sales Price | (USD/Unit) | 102.86 | 104.61 | 106.81 | 110.01 | 111.11 | 112.23 | 113.35 | 113.91 |
| Revenue | | 51,585 | 53,494 | 55,749 | 58,570 | 59,748 | 60,949 | 61,866 | 62,486 |
| Capacity Exceeded? | | - | - | - | - | - | - | - | Yes |

# Macabacus Documentation

**Configuration**  →

https://macabacus.com/docs

# Course Conclusion

Operational Modeling

# We Covered...

**Financial Modeling Overview**

**Revenue Schedule**

**Cost Schedule**

**Income Statement**

**Working Capital Schedule**

**Depreciation Schedule**

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